ON SOME NEW SPECIES OF EUCALYPTUS.

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(Plates xliii.-xlvi.)

E. intermedia, sp.nov.

"Bloodwood" or "Bastard Bloodwood."

(Plate xlvi., fig. 1.)

A medium-sized tree with a *light brown fibrous* bark.

Leaves lanceolate, acuminate, about 6 inches long, and 1-1½ inches wide or more, pale on the underside; lateral veins oblique, fine, numerous, parallel; intramarginal vein quite close to the edge.

Flowers mostly in large terminal corymbs. Calyx turbinate, 4 lines in diameter, 3 lines long, on a pedicel of about 4 lines. Ovary flat-topped. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits urceolate, about 6 lines long, 4-5 lines in diameter, contracted at the orifice to sometimes 2 lines; rim thin, capsule sunken.

Hab.—Ballina (W. Bäuerlen); Richmond and Clarence Rivers (Rev. Dr. Woolls); Barney's Wharf, Cambewarra (W. Bäuerlen, P. Macpherson).

A tree closely allied to both *E. corymbosa*, Sm., and *E. eximia*, Schau. It has, however, always been considered as the northern form of the former species, but in botanical characters it more nearly resembles the latter, and especially *E. maculata*, Hook. The chemical constituents and optical features place it midway between the two former. It differs from *E. corymbosa* in the

nature of the timber, bark, oil and fruits which have not the marked recurved rim of that species.

From *E. eximia* it differs in having pedicellate fruits, a stringy flaky bark, a pinkish timber, and in its chemical constituents.

Dr. Woolls was cognisant of the differences existing between these species, for in his "Flora of Australia" (p. 238) he states:— "At the Clarence and Richmond Rivers the 'Bloodwood' prevails to a great extent, and the workmen reckon two kinds – the one with smooth and the other with rough bark. . . It seems probable that the Mountain 'Bloodwood' (*E. eximia*), which overhangs the valley of the Grose, is different from the Bloodwood of the north." As stated above, other botanists have always regarded the northern "Bloodwood" as identical with the Sydney and southern "Bloodwood"; but Dr. Woolls is the only one who connected it (the northern one) with *E. eximia*, Schau., and recent observations also show it to have affinities with that species.

Its physical characters, however, are so evenly balanced between the two that it is decided to give it specific rank.

It differs from *E. terminalis*, F.v.M., the "Bloodwood" of the interior, in its bark, timber and oil; and from *E. trachyphloia* in its larger fruits, bark and chemical constituents.

Its fruits are exactly identical in size and shape with those of *E. maculata*, but it resembles this spotted gum in no other characters.

This tree is constant throughout an extensive range, as it was found many years ago at Barney's Wharf, Cambewarra, by W. Bäuerlen, who forwarded specimens to the late Baron von Müeller, who considered it a hybrid between *E. corymbosa* and *E. maculata*, but of course he only had dried material upon which to base his opinion.

The timber of both the southern and northern trees is similar in colour, hardness and other characters, and the chemical constituents of the oil show no variation.

Timber.—A pale-coloured timber, hard, straight-grained, and easy to work. It is much closer in texture than the Sydney

Bloodwood, *E. corymbosa*, Sm. The figure is occasionally not unlike that of *E. maculata*, Hook. Gum veins are not infrequent. It is considered a good durable timber, and superior to that of *E. corymbosa*, Sm. It has quite a metallic ring when the fractured edges of a piece are rubbed together.

Oil.—The yield from this oil is ·125 per cent. It consists very largely of pinene, 58 per cent. of the oil distilling below 172° C.; only a trace of eucalyptol could be detected. The specific gravity of the crude oil at 15° C. = ·8829. The specific rotation of the crude oil $[a]_D = +11{\cdot}2°$. This oil differs from the oil of the Bloodwood of the Sydney district, inasmuch as the latter is lævo-rotatory to about the same extent. The rotation of the oils from *E. corymbosa*, Sm., and *E. eximia*, Schau., and this species varies in about equal proportions, that of the oil of this species being about half-way between those of *E. corymbosa* and *E. eximia*, although the constituents of the oils of the three species differ but slightly, being largely pinene.

E. ANGOPHOROIDES, sp.nov.

"Apple-Top Box."

(Syn. *E. Bridgesiana*, Baker, *partim.*)

(Plate xlvi., figs. 4*a*, 4*b*, 4*c*.)

A medium-sized tree with a white box bark persistent to the ultimate branchlets.

Sucker leaves ovate-acuminate, cordate, shortly petiolate, glaucous, variable in size from 1 to 3 or 4 inches long, and 1 to 3 inches broad; venation indistinct on both sides. Leaves of mature trees narrow-lanceolate, about 6 inches long, acuminate, not shining, of the same colour on both sides; venation finely marked, oblique, spreading; intramarginal vein removed from the edge. Oil glands numerous.

Peduncles axillary, 3 to 4 lines long, slightly compressed, bearing a few flowers. Calyx hemispherical to pyriform, 1 line long; pedicel about 1 line long. Operculum hemispherical, shortly

acuminate. Ovary domed. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits hemispherical to slightly pear-shaped, 2 lines in diameter and under 4 lines long; rim thick, sloping outwards—a ring just below the edge; valves generally 4, exserted under 1 line.

Hab.—Colombo, N.S W. (W. Bäuerlen); Towrang, N.S.W. (R. T. Baker).

The herbarium material of this species is so similar to that of *E. Bridgesiana* that on my first examination it was included under that species (Proc. Linn. Soc. N.S.W., 1896.)

My field observations since that date, and the acquisition of further material such as timber and oil, have convinced me that the two trees are quite different, and should not be included under the same name. Mr. W. Bäuerlen, indeed, who has known the trees for very many years, has always held that the two were different in specific characters.

E. Bridgesiana is known vernacularly as "Apple" and "Woolly-butt," but this tree as "Apple-top Box." As stated above, the foliage, fruits and flowers certainly resemble those of the former species, but there the similarity ends. The bark is a true box-bark, but the timber is quite unlike that of a box.

It differs from *E. Cambagei*, Deane & Maiden, in the superiority of its timber and the inferiority of its oil, and the shape of its fruits; and from *E. nova-anglica*, Deane & Maiden, in the bark, colour of timber, and oil.

It has little affinity with such Boxes as *E. hemiphloia*, F.v.M., *E. Woollsiana*, Baker, *E. conica*, Deane & Maiden, *E. pendula*, A. Cunn., (*E. largiflorens*, F.v.M.), although it appears to be a connecting link with these and what are known as *Bastard Boxes* such as *E. Cambagei*, Deane & Maiden, and *E. bicolor*, A. Cunn.

It is quite limited in its distribution, and presents no difficulty of determination in the field.

The bark has not an essential oil as pertains to *E. nova-anglica* and *E. Bridgesiana*.

Although it has a regular light-coloured grey box bark, yet the appearance of the tree is more like that of an "Apple tree" (*Angophora*), hence the local name of "Apple-Top Box."

Timber.—A pale-coloured, soft, specifically light timber, open in the grain, and perhaps to be regarded as porous. It has not the broad sapwood of *E. Bridgesiana*, Baker. It seasons well, and is suited for cabinet work, as it closely resembles in colour, weight and texture the timber of *Angophora intermedia*, DC. It is much superior to that of *E. Bridgesiana*.

Oil.—The yield of oil from this species is ·185 per cent. A large quantity of phellandrene is present, also some pinene, and 26 per cent. of eucalyptol was found in the rectified oil (fraction representing 70 per cent. of the crude oil). The specific gravity of the crude oil at 15° C. was ·9049; the specific rotation of the crude oil = $[a]_D$ −12·7, the lævo-rotation being due to the phellandrene. The constituents of this tree differ greatly from those obtained for *E. Bridgesiana*, Baker, a species which in appearance it somewhat resembles. The oil of *E. Bridgesiana* is of excellent quality, while that of this species is of little commercial value, irrespective of the small yield (H. G. Smith).

E. Wilkinsoniana, sp.nov.

(Syn. *E. hæmastoma*, var., F.v.M., Eucalyptographia, Dec. ii.; *E. lævopinea*, var. *minor*, Baker).

(Plate xlvi., fig. 2.)

A medium-sized tree with a thin compressed stringybark—not furrowed.

Sucker leaves lanceolate, falcate, generally under 3 inches long and under 6 lines wide, oblique, thin; venation oblique, parallel, distant; marginal vein removed from the edge. Leaves of mature trees similar to sucker-leaves, only larger.

Flowers in axillary peduncles of about 6 lines long. Calyx small, 1 line long, 2 lines in diameter; pedicel about 1 line. Operculum small, hemispherical, acuminate. Outer stamens apparently sterile; anthers kidney-shaped. Ovary flat-topped.

Fruits hemispherical, 5 lines in diameter, rim thick, *red;* valves slightly exserted, acute.

Hab.—Dromedary Mountain (C.S. Wilkinson, F.G.S.); Colombo (W. Bauerlen); Barber's Creek (H. Rumsay); Sutton Forest (R. T. Baker).

This is the "Stringybark" variety of *E. hæmastoma*, Sm., mentioned by Baron von Mueller in his Eucalyptographia under that species.

It was first observed in this colony by the late Government Geologist, Mr. C. S. Wilkinson, F.G.S., at Dromedary Mountain at an elevation of 1,500ft. above sea level, and named for him by Mueller as stated above.

It differs, however, from *E. hæmastoma*, Sm., in the nature of the timber, texture and venation of leaves, bark and chemical constituents of the oil and kino; and it is on these differences that it is now raised to specific rank.

The bark and timber ally it to *E. eugenioides*, "White Stringybark," and in botanical sequence it is placed next to that species.

The oil resembles that of *E. lævopinea*, Baker, but no other characters connect it with that species.

The fruits, and particularly the oil, differentiate it from the other "Stringybarks," such as *E. capitellata*, Sm., *E. macrorhyncha*, F.v.M., *E. eugenioides*, Sieb., *E. dextropinea*, Baker.

The red rim of the fruits has evidently been the cause of the misplacing of this species, but it is well known now that this is a character common to a number of Eucalypts.

It is a feature quite absent from *E. lævopinea*, Baker. In fact the fruits of the two species are so very different that the trees could not be synonymised with any degree of correctness in specific naming. The bark, leaves, venation and timber of these trees also differ.

E. lævopinea, Baker, has a hard, compact bark right out to the branchlets, whilst this tree has a light-coloured, loose stringy bark, not extending out to the limbs.

It is quite distinct in specific characters from the two stringy barks described in this paper, viz., *E. nigra* and *E. umbra*.

Timber.—Pale-coloured, very hard, close-grained, heavy. In transverse and compression tests, it stands higher than that of any of the other Stringybarks above enumerated. It is evidently an excellent timber, and is strongly recommended for forest conservation.

Oil.—The yield of oil from this species averages about ·9 per cent. It consists very largely of lævopinene. A small quantity of eucalyptol is present in the oil at some time of the year, and a small quantity of phellandrene at others. This terpene alters much, occurring in small quantities in many Eucalyptus oils at certain seasons of the year, whilst at other times it is absent. The specific gravity of the crude oil was ·894 at 15° C.

The specific rotation of the crude oil = $[a]_D$—23·9; no phellandrene was detected in the January oils.

No less than 86 per cent. of the oil distilled below 170° C. The lævo-rotation of this oil is due to the lævopinene present, The odour of the oil after saponification of the small quantity of ester present is exactly that of oil of turpentine (H. G. Smith).

E. OVALIFOLIA, sp.nov.

"**Red Box.**"

(Plate xlvi., figs. 6*a*, 6*b*.)

A medium-sized tree with a smooth bark, decorticating at the base of trunk, producing a roughish appearance.

Leaves small, of light yellowish colour, sometimes glaucous, oval or ovate, shortly acuminate, mostly 2 inches long and $\frac{3}{4}$ inch wide, rarely 3 inches long; venation faintly marked, lateral veins distant, oblique, spreading, the marginal vein removed from the edge, producing at the base of the leaf a trinervate appearance. Petiole slender, under 1 inch long.

Flowers in axillary or terminal panicles, 6-8 in the head. Calyx under 2 lines long, 1 line in diameter, tapering into a slender pedicel. Operculum hemispherical, depressed, very shortly acu-

minate. Ovary flat-topped. Outer stamens sterile. Anthers parallel, opening by pores at the truncate end.

Fruits small, 2 lines long and $1\frac{1}{2}$ lines in diameter, rim thin, contracted slightly at the orifice, valves not exserted.

Hab.—Bathurst, Rylstone and Camboon (R. T. Baker); Hargraves (A. A Suttor); Gerogery (L. Mann).

A medium-sized or rather stunted tree growing in poor, sandy, rocky soil. The bark can hardly be said to be smooth, and neither is it altogether a box-bark such as that of *E. albens*, Miq., or *E. hemiphloia*, but rather between a box and a smooth bark. The upper parts of the trunk and limbs are quite smooth.

It is allied to *E. melliodora* in the shape and venation of the leaves, and perhaps in the exterior character of the bark, but it has not the yellow stain on the inner surface of the bark such as obtains in *E. melliodora*. It differs, however, from that species in the shape of the fruits, colour of timber, and chemical constituents of its oil.

It differs from the typical *E. polyanthema*, Sch., of Victoria, which has a persistent box-bark right out to the branchlets, larger and orbicular-shaped leaves, and larger fruits. The oils of the two species are not at all identical, but there is a resemblance in their timbers.

It differs from *E. conica*, Deane & Maiden, in having a smoothish bark, and in the shape of the leaves and fruits, and chemical constituents of the oil; nor can it be confounded with *E. pendula*, A. Cunn., (*E. largiflorens*, F.v.M.) which has a box-bark, and fruits and leaves quite different from this species.

The timber, leaves and bark differentiate it from the Lignum-vitæ, *E. Fletcheri*, Baker, of St. Mary's and Thirlmere.

In botanical sequence it is placed next to *E. Dawsoni*, Baker, as it approaches this tree in the colour of its timber, and occasionally in the shape of the leaves, but differs in every other respect.

There appears to be no reference to this tree in the writings of Dr. Woolls and Mr. A. G. Hamilton, both of whom wrote on the

Mudgee Flora, so that it must have escaped their observations, as it occurs at Hargrave, mid-way between Mudgee and Wellington.

Timber.—When growing on poor ironstone ridges the tree becomes rather stunted and the stem has a tendency to barrel, so that it yields only small specimens of timber. It is red-coloured, hard, close and straight-grained, and very durable in the ground. It is suitable for all kinds of heavy work.

Oil.—The yield of oil from this species is ·27 per cent. It contains much phellandrene and but a minute quantity of eucalyptol at time of distillation. It is not, however, a commercial oil. It is distinctly different from *E. polyanthema*, Schau., of the south, which gives a commercial oil rich in eucalyptol.

The specific gravity of the crude oil at 15° C. is ·9058. The specific rotation of crude oil $[a]_D = -9{\cdot}93°$.

There is very little difference in the constituents of this oil and that of *E. Fletcheri*, Baker, the "Lignum-vitæ" or Black Box at St. Mary's, as they both contain the same constituents in practically the same amount (H. G. Smith).

E. Fletcheri, sp.nov.

"Lignum-vitæ," "Box."

(Plate xlv.)

A medium-sized tree with a box-bark on the trunk, branches smooth, branchlets glaucous.

Leaves from orbicular to ovate-acuminate in shape, sometimes oblique, cuneate or rounded at the base, from 1 inch to 3 or 4 in diameter, thin, not shining; venation faintly marked, lateral veins oblique, spreading; intramarginal vein removed from the edge, more pronounced at the base, giving a trinerved appearance to the leaf. Oil glands very numerous; flowers numerous in axillary or terminal panicles; peduncles short, 2-3 lines long.

Buds about 5 lines long. Calyx conical, with scarcely any pedicel. Operculum hemispherical, very shortly acuminate or obtuse.

Ovary flat-topped. Outer stamens sterile. Anthers parallel, opening by terminal pores.

Fruits conical, about 4 lines long, 3 lines broad; rim thin, and mostly in mature fruits with a notch; capsule sunk.

Hab.—South Creek, St. Mary's (R. T. Baker and N. V. Fletcher); banks of the Nepean River (Rev. Dr. Woolls); Thirlmere (W. Cambage).

It is named after the late Norman Fletcher, B.A., a promising young botanist much interested in Eucalypts, who, in company with the author, some years ago discovered trees of this species at South Creek, St. Mary's, near the railway bridge.

A tree apparently restricted in its geographical distribution to the watershed of the Nepean River of this colony.

The late Dr. Woolls was very probably the first to collect material of this tree for botanical determination, and he forwarded it to Mueller under the local name of "Lignum-vitæ" (Eucalyptographia, Dec. iii). This latter author, working on morphological grounds, confounded it with the Victorian "Red Box," *E. polyanthema*, Schau. The dried specimens of the two species are very much alike in the shape of the leaves and fruits, but the trees differ considerably in other characters. For instance, the Victorian "Red Box" has a persistent *box-bark* right out to the branchlets, and a *dark red timber*, while its leaves are larger than those of this species. The New South Wales tree has *thick, rough, flaky bark*, and *the wood, which is of a brown colour* towards the centre, is very hard and tough, as recorded by Dr. Woolls (Fl. Aus. p. 236). The two timbers alone are sufficient to differentiate the trees, whilst their essential oils possess quite distinct chemical constituents.

This is another example showing how essential it is that field observations are required in order to determine correctly the specific rank of Eucalypts.

It generally occurs on the banks of rivers and creeks, growing along with *E. bicolor*, A. Cunn., but this latter species, although having a somewhat similar bark and timber, is quite different in the fruits, leaves, venation and oil.

In colour of timber and bark it appears to stand apart from the western "Boxes," such as *E. Woollsiana*, *E. conica*, Deane & Maiden, *E. albens*, Miq., but in fruit and shape of leaves it resembles *E. populifolia* and *E. polyanthema*, Schau., whilst it only approaches *E. conica* in the shape of the fruit.

The leaves are thinner than those of *E. populifolia*, and have not the lustre so distinctive of that species.

It differs also from this latter species in the shape of its fruits, and in its timber and oil.

E. quadrangulata, Deane & Maiden, has a lighter-coloured timber, sessile fruits with extended valves, and lanceolate leaves.

Timber.—It is well described by Dr. Woolls (*loc. cit.*). No doubt owing to its good qualities it has been extensively cut by timber-getters, as it is quite rare now in its original habitat (Nepean), but is more plentiful at Thirlmere. It is worthy of propagation.

Oil.—The yield of oil from this species is ·294 per cent. It contains much phellandrene and but a minute quantity of eucalyptol. In constituents and characters this oil differs but little from that obtained from "Red Box," *E. ovalifolia*, Baker, of Rylstone. The specific gravity of the crude oil at 15° C. is ·8805. Specific rotation of crude oil $[a]_D = -14{\cdot}2°$. The lævo-rotation is due to phellandrene. It is not a commercial oil. The amount of ester and free acid are small in this oil, consequently the crude oil is not very dark-coloured, the red colour of crude eucalyptus oils being due to the presence of a minute quantity of iron from the stills being dissolved in the free acid occurring in the oils. The colour is removed by agitating with potash.

Eucalyptus Woollsiana, sp.nov.

"Mallee Box."

(Plate xliii.)

A large tree up to 80 feet high, and more than 3 feet in diameter. Bark persistent half-way or more than half-way up the trunk; smooth, chiefly of a rich brown colour.

Sucker-leaves lanceolate, alternate, 2-3 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch broad. Mature leaves under 6 inches long, on a petiole less than $\frac{1}{2}$ inch; narrow-lanceolate, tapering to a fine recurved point, mostly of a thin texture, of a light yellowish-green, sometimes slightly shining; venation obscured, impressed on the upper surface; lateral veins few, intramarginal vein removed from the edge.

Peduncles axillary, from 2-12 lines long. Flowers few. Calyx about 1 line in diameter, tapering into a short stalk. Operculum hemispherical, acuminate, and often shorter and *more obtuse than shown in the plate.* Ovary flat-topped. Stamens all fertile; anthers parallel; connective large and long, attached at base to the filaments.

Fruits small, 1 line in diameter, hemispherical to slightly pear-shaped; rim thin, slightly contracted, valves not exserted.

Hab.—Girilambone, Cobar and Trangie (W. Bäuerlen); Nyngan and Murga (R. H. Cambage).

This tree is a half-barked "Box," and allied in bark and timber to *E. populifolia*, *E. albens* and other cognate box-trees.

Of all the box-trees described this species has probably the narrowest leaves. The fruits are small, and somewhat approach in shape those of the Green Mallee, *E. viridis*, Baker; but the bark, timber, and chemical constituents of the kino and oil differentiate it from that species.

The leaves have a shining surface occasionally, as pertains to *E. populifolia*, F.v.M., or *E. Behriana*, F.v.M. It differs from *E. microtheca* in the valves of the fruit not being exserted, in the colour of the wood, and in the bark and chemical constituents.

From *E. hemiphloia* it differs in the nature of its timber, oil, buds and leaves; from *E. pendula*, A. Cunn., in the venation and shape of the leaves, the shape of the fruits and constituents of the oil, and particularly in its timber, and it has a more erect habit than this species. *E. populifolia* has much wider leaves, but the bark of the species is very similar, but is not associated in any other respect with this species.

Mr. W. Bäuerlen states "that it is usually associated with *E. populifolia*, the Green Mallee (*E. viridis*, Baker), and the Grey Mallee (*E. Morrisii*, Baker), on which account it is called 'Mallee Box.' I have never seen it in mallee form, and as a result of my inquiries it appears that it does not grow in that form."

Of described species it is most closely allied to *E. hemiphloia* and other "Boxes" in oil, kino, and botanical characters.

It differs from *E. conica*, Deane & Maiden, in height, bark, timber, oil and fruits.

Although the two species are not easily separated on herbarium material, they are never confounded in the field.

Timber.—Hard, close-grained, interlocked, heavy, durable timber, of a brownish colour. Useful for bridge-decking, posts, railway sleepers, and general building purposes. It is in great request at the Cobar mines for shoring the roofs.

Kino.—Turbid in cold aqueous solution, but the turbidity is removed on boiling. The constituent present besides tannin is "eudesmin" (H. G. Smith). The kino is plentiful even on trees not in any way injured (W. Bäuerlen).

Oil.—The yield of oil from a large number of distillations was ·495 per cent. The oil contains but a small quantity of eucalyptol, less than 5 per cent., and consequently is not a commercial oil. It contains the aromatic aldehyde previously known as cuminaldehyde, and which constituent appears to be characteristic of true "Boxes." It has now been described and named aromadendral.

The specific gravity of the crude oil at 15° C. is ·889. The specific rotation of the crude oil is $[a]_D$—13·7°.

The lævo-rotation of this oil is due to the presence of the aromatic aldehyde (aromadendral).

Phellandrene is not present in this oil (H. G. Smith).

E. UMBRA, sp.nov.

"Stringybark," "Bastard White Mahogany."

(Plate xliv.)

A tall tree, attaining sometimes a height of 100 feet, with a dark-coloured stringybark.

Sucker-leaves opposite, sessile, cordate, ovate, acuminate, thin, pale-coloured on underside; venation more pronounced on the underside; upper surface shining; over 3 inches broad and under 6 inches long. Mature leaves lanceolate, falcate, large, up to 9 inches long and 1½ inches broad, *pale-coloured on both sides, coriaceous;* venation very distinct; lateral veins distant, spreading, oblique; marginal vein removed from the edge.

Flowers in short axillary peduncles, 6-9 in the umbel. Calyx 1 line long, on a pedicel about 2 lines long. Operculum hemispherical, shortly acuminate. Ovary flat-topped. Anthers kidney-shaped.

Fruits in the early stage pilular and under 3 lines in diameter, and the rim thin and valves sunken, but in the mature stage inclined to be pear-shaped, with a diameter of 5 lines, and a very thick red rim.

Hab.—Wardell, Dundoon, and Tumbulgum (W. Bäuerlen); Peat's Ferry, Military Road (R. T. Baker); Tinonee (J. H. Maiden); Gosford (J. Martin); Cowan Creek and Milton (R. H. Cambage); Eastwood (R. T. Baker).

The early fruits of this species have a remarkable resemblance to those of *E. acmenoides*, Schau.; in fact, so much so, that in herbarium material the two have very probably on this character been confounded in the past. The two species differ, however, considerably in the shape, texture, colour and venation of the leaves, as well as in the mature fruits, which have a broad rim.

E. acmenoides, Schau., has thin leaves with a pale undersurface, the leaves undoubtedly resembling those of an *Acmena (Eugenia*, as now understood). But those of *E. umbra* are of a uniform colour on both sides, longer and broader, and with a very marked venation much like that of *E. patentinervis*, Baker.

The sucker-leaves are quite distinct from those of *E. acmenoides*, which also has a lighter-coloured bark, but a superior timber.

E. acmenoides is well figured by Müeller in his "Eucalyptographia," and this species can be from the above description easily distinguished from it, so that it is not considered necessary to give a drawing here.

In botanical sequence it should be placed it next to *E. acmenoides*, from which species, however, it also differs in the chemical constituents of its oil, as well as in the nature of its timber and bark.

The broad sucker-leaves differentiate it from any described species of Stringybark, to which division of the Eucalypts it undoubtedly belongs; and, as stated above, this is one of the characters which separate it from *E. acmenoides*, Schau.

Mr. W. Bäuerlen gives the following description of this tree as observed by him in the northern scrubs :—

"Height 40-80 feet; diam. 2-4 feet. Bark stringy, used for bark. Timber usually pale-coloured, much like that of *E. acmenoides*, which tree it resembles also in the bark and general appearance, but is easily distinguished from it by its broader and thicker leaves, with a more bluish colour; especially by the very broad young leaves, somewhat yellowish in colour and conspicuously veined, while those of *E. acmenoides* are much smaller, narrower, thinner, and of a deeper green colour; in fact, much resembling those of *E. microcorys*, with which species both are associated, yet only *E. acmenoides* penetrates with *E. microcorys* into the rich scrub, while this species is only found in the poorer forest country. The two species being otherwise much alike in general appearance, they are readily distinguished by the timber-getters, who invariably prefer and select *E. acmenoides* for splitting into posts and rails, etc., for which purpose *E. acmenoides* bears an excellent name, whilst this species is somewhat inferior, and does not split quite so well."

Timber.—A dirty pale-coloured timber, darker than White Mahogany, *E. acmenoides*, Schau. It is subject to the attacks of a borer, which, of course, deteriorates its quality as a marketable timber. It is hard and close-grained, but does not season well,

and is altogether a much inferior timber to White Mahogany, *E. acmenoides*—a fact well-known to the timber-getters.

Oil.—The yield of oil from this species is ·155 per cent. No phellandrene was found, but much dextropinene was present. It contains but a minute quantity of eucalyptol.

The characteristic constituent of the oil from this species is an acetic acid ester. The specific gravity of the crude oil at 15° C. was ·8963.

The specific rotation of the crude oil was $[a]_D + 41{\cdot}5$.

The saponification figure for the ester was 35·8.

Another consignment of the leaves of this species was received a month later, and gave practically identical results, showing again the constancy of the constituents in the oils of the same species.

The yield of oil was ·169 per cent.; specific gravity crude oil = ·8901.

Specific rotation crude oil was $[a]_D + 43{\cdot}8$, and the saponification figure for the ester was 35·3 (H. G. Smith, F.C.S.).

E. NIGRA, sp.nov.

"Black Stringybark."

(Plate xlvi., fig. 3.)

A tall tree with a black stringy bark.

Leaves lanceolate, scarcely falcate, occasionally oblique, mostly under 4 inches long and under 1 inch wide, of a dull green colour; venation only faintly marked on the upper surface, but very distinct on the lower; lateral veins oblique, distant; intramarginal vein removed from the edge.

Peduncles axillary, short, under 4 lines, bearing a cluster of from 8-12 small flowers. Calyx hemispherical, under 2 lines in diameter, on a short pedicel. Operculum hemispherical, acuminate, about $1\frac{1}{2}$ lines long when mature. Ovary flat-topped. Anthers very small, parallel, filaments very slender.

Fruits about 4 lines in diameter, hemispherical to pilular, rim variable, thin, or truncate and even domed occasionally, valves slightly exserted.

Hab.—Richmond River District (W. Bäuerlen); Cook's River Sydney (H. G. Smith).

From *E. Wilkinsoniana*, Baker, and *E. macrorhyncha*, F.v.M., it differs in fruits, timber and chemical constituents of the oil. From the Stringybark, *E. umbra*, Baker, of this paper it differs in the shape of the sucker leaves and chemical constituents of the oil, although the immature fruits of these species are somewhat similar.

E. eugenioides, Sieb., and *E. capitellata*, Sm., approach each other very closely in morphological characters, and there often seems to be a gradation between the two, but, nevertheless, the two species are quite distinct; and so in this, although there also appears some similarity in the fruits of this species and *E. eugenioides*, yet the two differ in too many characters to be the same species.

The sucker-leaves are not unlike those of *E. capitellata*, whilst the buds are similar to those of *E. eugenioides*. The fruits approach somewhat in shape those of the latter species, with which it has probably been confounded in the past when determined on dried specimens.

If it were not for the distinctive character of the timber and oil I should certainly have made it a variety of *E. eugenioides*, but the former product is of too poor a character to be associated with so excellent a timber as that yielded by White Stringybark, *E. eugenioides*. The oil also differentiates it entirely from that species.

On the sum of the above differences it was decided to give the tree specific rank, and botanically it is placed next to *E. dextropinea*, Baker, from which it differs in the shape of the fruits, bark, leaves and chemical constituents. From *E. lævopinea*, Baker, it differs in the shape of the fruits, quality of timber and constituents of the oil.

Timber.—Of a *dark brown colour* (hence the specific name), much affected with borers and not valued for durability by timber-getters and others interested in the trade.

Oil.—Yield very small, only $3\frac{1}{2}$ oz. from 534 lbs. of leaves, in fact too small to make a fractional distillation. It has thus the smallest yield of the stringy-barks next to *E. capitellata* (H. G. Smith).

Eucalyptus lactea, sp.nov.

"Spotted Gum."

(Plate xlvi., fig. 5.)

A fair-sized tree with a dirty, flaky bark, which occasionally is smooth.

Sucker leaves ovate; leaves of mature trees lanceolate, up to 6 inches long and varying in breadth up to 9 lines, straight or falcate, not shining, of the same shade of green on both sides; petiole under 1 inch. Venation fairly well marked, veins oblique, spreading, the distinct intramarginal vein removed from the edge. Oil dots numerous.

Peduncles axillary, with few flowers (5 to 7) in the head, occasionally only 3. Calyx hemispherical. Operculum hemispherical, shortly acuminate. Ovary flat-topped. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits hemispherical to oblong; rim with valves domed and almost touching, thus leaving only a slight aperture to the ovary; or the rim thin and the valves exserted and widely distended.

Hab.—Mount Vincent, Ilford (R. T. Baker); Oberon Road, O'Connell (R. T. Baker, R. H. Cambage); Southern Road, Wingello (R. T. Baker, H. G. Smith); along the main Western Road, Blackheath and Mt. Victoria (R. T. Baker).

In the field this tree might be confounded with *E. viminalis* or *E. hæmastoma*, as both these Eucalypts have a similar although variable bark.

The bark of this species, however, never has the horizontal "scribble" insect markings almost invariably occurring on *E. viminalis*, Labill., and *E. hæmastoma*. It has similarly shaped leaves in all its stages of growth, whilst the sucker-leaves of *E. viminalis* are narrow, cordate-lanceolate, sessile.

The fruits differ from those of *E. viminalis* in shape, rim, and direction of valves. The trees too are not found near water, as pertains almost invariably with *E. viminalis*, but on dry, stony ridges. It differs also from that species in the constituents of its oil.

It resembles *E. maculosa*, Baker, in the shape of the fruits, but differs from it in the timber, bark and oil constituents. It differs from *E. hæmastoma*, Sm., in timber, fruits, leaves and chemical constituents of the oil; and from *E. aggregata*, Deane & Maiden, in bark, fruit, oil and habitat.

Its specific characters differentiate it from any of the other smooth-barked species. Of the rough-barked Eucalypts its fruits are often not unlike those of *E. fastigata*, Deane & Maiden, and *E. Smithii*, Baker.

The specific name refers to the copious exudation of a milky substance from the stem when the tree is cut at certain seasons of the year.

Timber.—A very pale-coloured, whitish timber, fissile, only used for fuel, much softer than that of *E. hæmastoma*.

Oil.—The yield of oil was ·541. It is not a commercial oil at present, as it contains but a very small quantity of eucalyptol. No phellandrene is present.

The specific gravity of the crude oil was ·8826 at 15° C.; of the rectified oil ·8788.

The crude oil has no rotation, while the rectified oil had a rotation of 1° in a 100 mm. tube.

A sample of oil from this species, obtained from Charley's Forest, Braidwood, was almost identical with that from Ilford in constituents and physical characters (H. G. Smith).

Eucalyptus polybractea, sp.nov.

"Blue Mallee."

(Plate xlvi., figs. 7-8.)

A glaucous Mallee, with quadrangular branchlets.

Leaves lanceolate (those on the early shoots lanceolate to oblanceolate), erect, rarely falcate, not oblique; narrow, under 6

lines broad, mostly 3 inches long, acuminate, often with a recurved point; midrib raised on the underside, giving the leaf a strong resemblance to that of an *Olea*, not shining; intramarginal vein removed from the edge, lateral veins oblique, spreading, finely marked, only occasionally distinctly pronounced; petiole about 3 lines long. Oil glands very numerous.

Peduncles axillary, short, 2-3 lines long, angled, with from 8-12 flowers. Buds in the early stage of development angular, surrounded *by numerous acuminate*, glabrous, ribbed, whitish *bracts*, short, 1 to 1½ lines long, glaucous. Calyx conical, tapering into an exceedingly short pedicel. Operculum obtuse, or only very slightly acuminate, hemispherical. Ovary flat-topped. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits hemispherical to pear-shaped, 2 lines in diameter, glaucous; rim thin, slightly contracted, valves deeply set, not exserted.

Hab.—West Wyalong (R. H. Cambage, L.S.).

This Eucalypt is one of the Mallees occurring between the Lachlan and Murrumbidgee Rivers, where it is known as "Blue Mallee," to distinguish it from its congeners.

The dried herbarium material is not easily separated from that of *E. viridis*, Baker, *E. Woollsiana*, Baker, and *E. conica*, Deane & Maiden, as the fruits of all these species are almost, if not identical; but this Eucalypt differs principally from them in never attaining tree-form, and in respect of its floral bracts.

Other points of difference are the angular buds, its glaucous character, shape of the leaves and quadrangular branchlets, whilst the most marked distinctive character of all is its oil, the yield and chemistry of which place it amongst the most valuable of our trees famous for the medicinal qualities of their oils.

Amongst other Mallees, it differs (1) from *E. gracilis*, F.v.M., and *E. dumosa*, A. Cunn., in the shape of the fruits and leaves, and the constituents of the oil; (2) from *E. oleosa* in the absence of the long, well-exserted valves, leaves and chemical constituents.

In botanical sequence it is placed next to *E. viridis*, as the fruits and leaves mostly resemble that species.

E. Woollsiana and *E. conica* have much broader leaves, and are classified amongst the "Box" group of Eucalypts.

Oil.—The oil obtained from this species is one of the best for Eucalyptus oil distillation growing in this colony. The yield of oil, obtained from material sent from Wyalong in the beginning of December, was 1·35 per cent. The crude oil was only slightly coloured, being of a lemon tint. The odour reminded one of eucalyptol, and volatile aldehydes are but present in minute quantities. Free acid and ester are also comparatively small. 91 per cent. of the crude oil was obtained boiling below 183° C., and this contained 57 per cent. eucalyptol; no phellandrene was present, but pinene was detected. The crude oil was slightly lævo-rotatory, due to the presence of aromadendral (the previously supposed cuminaldehyde). The specific gravity of the crude oil at 15° C. was ·9143, and of the rectified oil ·9109, this comparatively low specific gravity being due to the presence of such a small amount of constituents having a high boiling point. The specific rotation of the crude oil was $[a]_D$—2·13° (H. G. Smith).

EXPLANATION OF PLATES XLIII.-XLVI.

Plate xliii.

E. Woollsiana, sp.nov.

Fig. 1.—Individual leaf.
Fig. 2.—Buds.
Fig. 3.—Flowering twig.
Fig. 4.—Anthers (enlarged).
Fig. 5.—Clusters of fruits.

Plate xliv.

E. umbra, sp.nov.

Fig. 1.—Sucker leaves.
Fig. 2.—Ordinary leaf.
Fig. 3.—Twig with buds.
Fig. 4.—Anther (back and front view; enlarged).
Figs. 5, 6.—Fruits.

PLATE XLV.

E. Fletcheri, sp.nov.

Fig. 1.—Sucker leaf.
Fig. 2.—Twig with buds.
Fig. 3.—Flowering twig.
Fig. 4.—Stamens (enlarged).
Fig. 5.—Anther (enlarged).
Fig. 6.—Cluster of fruits.

PLATE XLVI.

Fig. 1.—Fruit of *E. intermedia*, sp.nov.
Fig. 2.—Fruit of *E. Wilkinsoniana*, sp.nov.
Fig. 3.—Fruits of *E. nigra*, sp.nov.
Fig. 4*a*, 4*b*, 4*c*.—Fruit and leaves (mature and sucker) of *E. angophorides*, sp.nov.
Fig. 5.—Fruit of *E. lactea*, sp.nov.
Fig. 6*a*, 6*b*.—Fruit and leaf of *E. ovalifolia*, sp.nov.
Fig. 7.—Fruits of *E. polybractea*, sp.nov.
Fig. 8—Buds (showing bracts) of *E. polybractea*, sp.nov.